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EXAMINER				
CALANDRA, ANTHONY J				
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1791				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/583,711

**Applicant(s)**

GRONQVIST ET AL.

**Examiner**

ANTHONY J. CALANDRA

**Art Unit**

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SE-US)  
Paper No(s)/Mail Date 3/11/2009
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

***Detailed Office Action***

The communication dated 3/11/2009 has been entered and fully considered.

Claims 1, 2, 5, 6, 7, 10, 11, 15, 16, 17 and 19 have been amended. Claims 21-25 are new. Claims 1-25 are currently pending.

***Response to Arguments***

***Double Patenting Rejections:***

In light of the filing of the terminal disclaimer the double patenting rejections have been withdrawn (the TD is currently awaiting approval by the paralegal department). In light of abandonment of the double patenting rejection towards the '340 application has been withdrawn.

In light of amendment the rejections towards claims 5, 6, and 19 have been withdrawn.

***The applicant traverses the examiners rejection of claim 15 arguing that 0.0001 to 10 mg protein/g dry matter is a separate range from the enzyme dosage and therefore is not narrower range of enzyme dosage (1-100,000 nkat/g of pulp).***

Both ranges measure the amount of enzyme on pulp. If the activity of the enzyme is known, for instance, 1 mg of enzyme is equivalent to 100 nkat. This would then allow the conversion of 1-100,000 nkat/g of pulp to 0.01-1,000 mg protein/g pulp which is a different range. However, the examiner agrees with the applicant's point that the person of ordinary skill in the art may want to limit both ranges as independent variables (i.e. there are enzyme strengths

that the applicant can exclude using both of the above limitations), hence, the examiner has withdrawn the argument to there being a broad/narrow range.

The examiner has not withdrawn the rejection to claim 15 based the value nkat/g. The applicant still gives an undefined explanation for how this is calculated. The applicant states that "The determination of the enzyme activities has been carried out in the examples in the same conditions (pH, temperature) using standard activity measurements in the conditions in which the enzyme treatments of the materials have been effected".

This is in contrast to an art such as PEDERSEN which specifically describes how to calculate the laccase enzyme activity in the publication:

*"(37) Laccase activity as defined herein is determined on the basis of spectrophotometric measurements of the oxidation of syringaldazin under aerobic conditions. The intensity of the violet colour produced in the oxidation reaction is measured at 530 nm.*

*(38) The analytical conditions are: 19 .mu.M syringaldazin, 23.2 mM acetate buffer, pH 5.5, 30.degree. C., reaction time 1 minute, shaking. 1 laccase unit (LACU) is the amount of enzyme that catalyses the conversion of 1 .mu.M of syringaldazin per minute under these conditions".*

In contrast the instant specification gives no applicable temperature or pH. The applicant's explanation in the arguments does not clear up the deficiencies as the arguments state that the activity value is based off of each experimental pH/temperature combination. In general activity values are measured in comparison to a standard set of assay conditions not a set of conditions which changes based on variable temperatures/pH's [see e.g. Units of Enzyme

Activity pg. 319 #1]. Since the Applicant gives variable temperatures/pHs that can be used, the definition of nkat/g is also necessarily variable and indefinite.

Therefore when PEDERSEN when gives a specific point of 3 LACU/g which equals 50 nkat/g (1U = 16.67 nkat [see e.g. Units of Enzyme Activity pg. 320 #5]) and falls with the instant claimed ranges of claims 15 and 23 the examiner cannot be sure if the teaching of PEDERSEN anticipates/makes obvious said ranges.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 15 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 15 and 23 are rejected based on the indefinite definition of nkat/g. The applicant still gives an undefined explanation for how this is calculated. The applicant states that "The determination of the enzyme activities has been carried out in the examples in the same conditions (pH, temperature) using standard activity measurements in the conditions in which the enzyme treatments of the materials have been effected".

This is in contrast to an art such as PEDERSEN which specifically describes how to calculate the laccase enzyme activity in the publication:

“

(37) *Laccase activity as defined herein is determined on the basis of spectrophotometric measurements of the oxidation of syringaldazin under aerobic conditions. The intensity of the violet colour produced in the oxidation reaction is measured at 530 nm.*

(38) *The analytical conditions are: 19 .mu.M syringaldazin, 23.2 mM acetate buffer, pH 5.5, 30.degree. C., reaction time 1 minute, shaking. 1 laccase unit (LACU) is the amount of enzyme that catalyses the conversion of 1 .mu.M of syringaldazin per minute under these conditions".*

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*Art rejections*

*Art rejections towards PEDERSEN*

**Applicant traverses the rejection to PEDERSEN stating that ferulic acid does not introduce a property foreign to the fiber. Applicant argues that ferulic acid merely increases the charge of the fiber and said charge is not 'foreign'.**

The applicant's arguments are not commensurate with the scope of claims or the specification. The claims state specifically properties that are 'foreign to the fiber material'. An increased charge that could not be present without some sort of modification is a 'foreign property'.

Further, in the specification applicant gives example 1 [pg. 12] of bonding ferulic acid and the change being detected by conductometric titration.

In the second example the applicant bonds L-DOPA [pg. 12], that the modification only increases nitrogen content as compared to the reference pulp. By the applicant's arguments the pulp property of increased nitrogen would not be a 'foreign' property.

In the third example in the specification the applicant teaches the bonding of a radiometric compound. Said compound only increases the measurable radioactivity (all living things contain radioactive carbon-14 and are thus at least somewhat radioactive). By the applicant's arguments the pulp property of increased radioactivity would not be a 'foreign' property.

Additionally, ferulic acid also prevents photo-yellowing and thus acts as a whitening agent/UV-resistant compound and therefore adds properties that are clearly foreign (based on the applicant's argument definition) to the fiber.

**Applicant argues that in instant claim 2 the polyacrylate is not *chemically* bonded to the fiber since polyacrylate merely absorbs to the fiber.**

This argument is not commensurate with the claim. The claim does not state chemical bonding. Therefore the examiner must take the broadest interpretation as supported by the specification. The specification includes all types of bonding including both physical and chemical [pg. 8 lines 20-22].

**Applicant argues that it is ‘unclear’ what the mediator that the examiner is referring to.**

The examiner refers to the word mediator/signaling agent when discussing ferulic acid.

**Applicant argues against JASCHINSKI that JASCHINSKI oxidizes fibers using hydrogen peroxide and argues that phenantroline is not a phenolic group.**

The examiner disagrees. The lignin of the fiber which is being bleached is oxidized. The phenantroline has two groups which the applicant states can be bonded to the fibers. However, as PEDERSEN also teaches nitrogen compounds for binding to the fiber and the rejections would be cumulative, the examiner has withdrawn the JASCHINSKI rejections.

#### ***Claim Objection***

Claim 12 should depend upon instant claim 3 not claim 1 for proper antecedent basis of the claimed "substance capable of catalyzing...".



***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-14, 16-20, 22, 24, and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,187,136 PEDERSEN et al., hereinafter PEDERSEN.

As for claim 1, PEDERSEN discloses oxidizing lignocellulose phenol groups [column 8 lines 25-37] and then contacting the cellulose with a compound with a first functional group, ferulic acid [column 10 lines 25-30]. The ferulic acid provides the fiber with a property that is foreign to the native fiber and acts as a signaling agent. Ferulic acid increases surface charge [column 10 lines 55-60] and can be detected with conductometric titration, therefore it is a signaling agent.

As for claim 2, PEDERSEN discloses oxidizing lignocellulose phenol groups [column 8 lines 25-37] and then contacting the cellulose with a compound with a first functional group, ferulic acid [column 10 lines 25-30]. Subsequent to this step the lignocellulosic fiber is contacted with an additional component a strengthening agent cationic starch or cationic polyacrylate [column 9 lines 1-16]. The polyacrylate increases the strength of the fiber matrix. The strength of the fiber matrix can be tested with physical strength testing therefore polyacrylate acts as a signaling agent. Further, polyacrylate could be detected by way of mass spectroscopy as the addition to fibers would alter the chemical composition.

As for claim 3 and 4, PEDERSEN discloses that the fiber matrix is reacted with an enzyme oxidizing agents including laccase [column 6 lines 1-10 and column 10 lines 25-32]. PEDERSEN discloses that the enzyme oxidizes the phenolic structures and that the mediator (ferulic acid and other compounds) is bonded to the fiber. Therefore the mediator/signaling agent is activated [column 4 lines 1-35].

As for claims 5, 6, and 9, PEDERSEN discloses that ferulic acid is bound to the lignocellulosic fiber [column 10 lines 25-30]. Ferulic acid increases the fibers surface charge [column 10 lines 55-60] thus it acts as an electrically conductive substance. Ferulic acid is detectable under conductometric titration. Ferulic acid also serves to prevent photo-yellowing thus it also acts as a signaling agent that can be detected by color change. Finally the addition of ferulic acid would be detectable under mass spectroscopy. Mass spectroscopy measures the relative abundance of various components of a sample. As ferulic acid changes the lignocellulosic fiber composition it would be detectable.

As for claim 7, 8, 10 and 11, ferulic acid has more than one functional site including double bonds and a phenol, hydroxyl groups, and carboxyl groups which are functional sites. PEDERSEN also discloses various other substances with multiple functional groups [column 5 lines 9-4].

As for claims 12, 13, 14, 16, 17, 18, 22, and 25 PEDERSEN discloses laccases, peroxidases, and oxidases for oxidizing the phenolic group [column 6 lines 1-30]. PEDERSEN also discloses peroxides and oxygen oxidants including atmospheric air [column 7 lines 60-67 and column 8 lines 1-10].

As for claim 19, and 24 PEDERSEN discloses the consistency ranges of 0.1 to 40% which overlaps with the instant claimed range with sufficient specificity [column 5 lines 3-7].

As for claim 20, PEDERSEN discloses the temperature range of 20-80 degrees C which falls within the instant claimed range [column 8 lines 30-32].

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 15 and 23 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over 6,187,136 PEDERSEN et al., hereinafter PEDERSEN.

PEDERSEN discloses 0.001-10 mg enzyme per gram dry matter which is the instant claimed range [column 6 lines 60-67]. The applicant claims an enzyme dosage nkat/g (nanokatal/g) which the examiner has interpreted as an enzyme activity on pulp. However, the applicant does not state what the defined assay conditions this enzyme activity is measured. At different temperatures an enzyme can have different activities. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant. PEDERSEN discloses 0.02 LACU/g -2000 LACU/g [column 6 lines 40-47] of enzyme where an LACU is measured under disclosed conditions [column 6 lines 55-60]. Until shown otherwise the examiner has interpreted these ranges to overlap with the instant claimed ranges [since the applicant fails to define the units].

Therefore when PEDERSEN when gives a specific point of 3 LACU/g which equals 50 nkat/g (1U = 16.67 nkat [see e.g. Units of Enzyme Activity pg. 320 #5]) and falls with the instant claimed ranges of claims 15 and 23

Alternatively, at the time of the invention it would have been obvious to optimize the enzyme activity on pulp [2144.05 (II) (B) Optimization of ranges and result effective variables]. PEDERSEN clearly shows enzyme activity on pulp to be a result effective variable and therefore

its optimization would have been obvious to a person of ordinary skill, absence evidence of unexpected results.

3. Claims 1, 5, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Handbook for Pulp and Paper Technologists by SMOOK in view of U.S. 5,935,383 SUN et al. hereinafter SUN.

SMOOK discloses brightening high yield mechanical pulps using peroxide which oxidizes the phenolic structures of the lignin [pg. 183 column 2 and pg. 184 column 4]. SMOOK does not teach adding a fluorescent compound that covalently bonds to the fiber. SUN discloses adding a fluorescent compound which covalently bonds to the fiber [abstract, column 5 line 64 – column 6 line 15].

At the time of the invention it would have been obvious to a person of ordinary skill in the art to treat the peroxide brightened pulp of SMOOK using the covalently bonding fluorescent compound of SUN. The person of ordinary skill in the art would be motivated to do so to prevent photoyellowing which is common with brightened mechanical pulps such as those described by SMOOK [column 4 lines 17-21]. The treatment has an additional advantage that wet-strength additives can be added to the furnish to improve the strength of any final product paper sheets having a synergistic effect with the fluorescent compounds [column 4 lines 21-25, column 6 lines 6-12].

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. CALANDRA whose telephone number is (571) 270-5124. The examiner can normally be reached on Monday through Thursday, 7:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anthony J Calandra/  
Examiner, Art Unit 1791

/Eric Hug/  
Primary Examiner, Art Unit 1791